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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/538,570
Filing Date	March 29, 2000
First Named Inventor	George J. Rebane
Art Unit	3623
Examiner Name	Andre D. Boyce
Total Number of Pages in This Submission: 47	Attorney Docket Number: BIZ/99-0008

ENCLOSURES *(Check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☑ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
  - ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) _____
- ☐ After Allowance communication to Technology Center (TC)
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☑ Other Enclosure(s) (please Identify below):

See "Remarks"

Remarks

- Cover Letter (2 pages)
- Amended Brief Before the Board of Patent Appeals and Interferences (41 pages)
- Evidence Appendix B (3 pages)
- Return Receipt Postcard

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Joel C. Corcoran, Reg. No. 53,854
Signature	
Date	May 5, 2005

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Typed or printed name	Stephen R. Pendleton		
Signature		Date	May 5, 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

George J. Rebane

Serial No.: 09/538,570

Filed: March 29, 2000

Date: May 5, 2005

Examiner: Andre D. Boyce

Art Unit: 3623

Atty Docket No.: BIZ/99-0008

For: SYSTEM AND METHOD FOR DATA COLLECTION, EVALUATION, INFORMATION GENERATION, AND PRESENTATION

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450
Attn: Examiner Andre D. Boyce

COVER LETTER

Dear Sir:

Enclosed is a response to the Notification of Non-Compliant Appeal Brief (37 C.F.R. § 41.37). Appellant's representative has revised the appeal brief in accordance with the notification, but has not re-submitted the decisions cited therein (which were submitted with the original appeal brief on January 26, 2005). Specifically, the appeal brief has been revised by:

- Placing the items required under 37 C.F.R. § 41.37(c) in the proper order under proper headings;
- Including a concise explanation of the subject matter defined in each of the independent claims involved in the appeal as required under 37 C.F.R. § 41.37(c)(1)(iv); and
- Including a concise statement of each ground of rejection presented for review as required under 37 C.F.R. § 41.37(c)(1)(vi).

The appeal brief is now in proper form for consideration by the Board of Patent Appeals and Interferences. If any outstanding issues remain, applicant's representative requests the favor of a telephone call at the number provided below in order to expedite and facilitate this appeal process.

Respectfully submitted,

Date: May 5, 2005

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

George J. Rebane

Serial No.: 09/538,570

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Alexandria, VA 22313-1450
Attn: Examiner Andre D. Boyce

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Printed Name: Stephen R. Pendleton
Date of Deposit: May 05, 2005

AMENDED BRIEF BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

This is an appeal from a Final Rejection dated August 23, 2004. A Notice of Appeal was received by the Patent Office on September 27, 2004. This appeal brief was originally filed with a request for a two-month extension of time and accompanying fee on January 26, 2005. A Notification of Non-Compliant Appeal Brief (37 C.F.R. § 41.37) was mailed on April 5, 2005, imposing a deadline of May 5, 2005, for a response. Appellant's representative hereby submits a brief that complies with the formal requirements of 37 C.F.R. § 41.37 to avoid dismissal of the appeal.

REAL PARTY IN INTEREST

The real party in interest is Shopzilla, Inc. (formerly known as BizRate.com before a name change), a corporation organized under the laws of the State of California, having a mailing address of 12200 W. Olympic Blvd., Suite 300, Los Angeles, CA, 90066.

RELATED APPEALS AND INTERFERENCES

Neither Appellant, nor Appellant's legal representatives, nor the assignee are aware of any other appeals or interferences that will directly affect, be directly affected by, or have a bearing on the Board's decision in this pending appeal.

STATUS OF CLAIMS

Claims 1-11, 13-20, 22-24, 27, 31, 51, 53-55, 57, 58, 60, 62-67 and 89-95 remain pending in the application and are presented in attached Appendix A. All of these claims stand as finally rejected in the last Office action, and Appellant appeals all of these claims. However, the claims presented in attached Appendix A do not reflect the changes made by Appellant in the amendment that accompanied the initial filing of this appeal brief because Appellant has not received any notice that the Examiner has entered that amendment.

The application was originally filed with claims 1-28 and 30-95; due to a typographical error in claim numbering, no claim 29 was included with the original application. After a restriction requirement imposed in the Office action dated September 30, 2002, Appellant cancelled claims 35-50 and 69-88 and elected to pursue claims 1-34, 51-68, and 89-95. An Office action was mailed on December 9, 2003, and as part of the response to that Office action filed on May 14, 2004, Appellant then cancelled claims 12, 21, 25, 26, 28, 30, 32-34, 52, 56, 59, 61, and 68 to arrive at the current set of pending claims that Appellant hereby appeals—claims 1-11, 13-20, 22-24, 27, 31, 51, 53-55, 57, 58, 60, 62-67 and 89-95.

STATUS OF AMENDMENTS

An amendment was filed on January 26, 2005, with the initial copy of this brief. The purpose of that amendment was to remove certain minor issues from appeal (see Issue No. 1 and related arguments), which does not require compliance with 37 C.F.R. § 1.116. See M.P.E.P. § 1207.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 encompasses a system based around a plurality of processing modules configured for presenting information following sequential processing of data by the processing modules. At least two of the processing modules are selected from a group consisting of:

a data stabilizer processing module;
a saturation limited forecasting module;
a dynamic activity-level icon module; and
an alarm filter module.

The data stabilizer (DS) module smoothes noisy or variable data using a computational solution of a minimum variance Bayesian estimation method (application, page 42 line 1 to page 56; ref. no. 221 in the drawings). FIGS. 7-8 generally illustrate the data stabilizer module, and equations 1-34 in the application provide the mathematical and statistical bases for data stabilizer module operation. The DS can stabilize or filter consumer ratings data and provides a substantial and patentable advance over prior methods of processing and evaluating such data, particularly in the area of business ratings, market research studies, and consumer demographics (see application, page 43 lines 1-8).

The alarm filter module monitors data rates, detects deviations from a desired threshold of a normative rate, and emits a signal when such deviations are detected (application, page 56 line 15 to page 60 line 25; ref. no. 28 in the drawings). FIG. 3 shows alarm filters 28 connected to one or more data channels 15 between server 14 and database 16; an alarm filter 28 may be associated with any data channel or channels between two system components (application, page 58 lines 5-6).

A saturation limited forecasting (SLF) module forecasts population growth based on a set of early observations; the employed algorithm forecasts growth of a population to a maximum attainable level based on historical or recently captured data and a saturation population function (application, page 61 line 1 to page 68 line 20; ref. no. 222 in the drawings). For example, the SLF model may be used to predict sales volumes for a category or categories of goods or services; number of females over the age of 18 participating in e-commerce; number of merchants offering a certain category of goods or services (application, page 60 lines 27-30). An example of an SLF Model is more specifically shown in Fig. 10 as processing module 222.

The dynamic activity-level icon module iconically displays relative levels of activity at network sites for different merchants offering competitive goods or services (application, page 68 line 25 to page 72, line 19). As just one example, FIG. 15 shows a flow chart for an activity module process 23 that receives data input from a data source, such as database 20. The example is in terms of the level of sale transactions on a point-of-sale website. In step 23.1, the point of sale ("POS") data for a merchant is read from database 20. In step 23.2, the number of POS transactions for the merchant is calculated. In step 23.3, the calculated value is returned to display database 24. The calculated value is then accessible to presentation server 26 in step 23.4. Presentation server 26 presents the calculated value as a dynamic icon accessible to remote computer systems through their web browser, for example.

Independent claim 8 encompasses a system based around a plurality of processing modules configured to present to plurality of remote computer systems, via a computer network, a set of items or data generated from the sequential processing of the data by the at least two processing modules. The at least two processing modules are to the same as those described relative to claim 1, although the dynamic activity-level icon module iconically indicates a level of activity at each of a plurality of merchant network sites; the module automatically causes the indication of activity to be sent to the user's remote computer system upon user access to an electronic page, such as a web page, that lists a plurality of merchants (see application, page 71).

Independent claim 51 encompasses a computer-implemented method based on three steps:

1. Capturing data over the Internet from a first plurality of remote computer systems;

2. Performing a predefined set of operations on data received from that first plurality of remote computer systems using at least two processing modules; and

3. Presenting the selected items of processed data or information following the sequential process of the data by the at least two processing modules.

The processing modules mentioned in claim 51 are similar to the modules included in claims 1 or 8.

Independent claim 89 encompasses a presentation server that includes web pages containing data or information derived from at least two processing modules

similar to those described in claims 1 or8. A presentation server presents data or information to an end-user (application, page 29 lines 2-3; page 39 line 11 to page 40 line 4; and ref. no. 26 in the drawings), and the web pages are accessible to a plurality of remote **merchant** systems over a computer network.

Independent claim 90 encompasses a presentation server that includes web pages containing data or information derived from at least two processing modules similar to those described in claims 1 and 8. A presentation server presents data or information to an end-user (application, page 29 lines 21-22; page 40 line 16 to page 41 line 2; and ref. no. 26 in the drawings), and the web pages are accessible to a plurality of remote **consumer** systems over a computer network.

Before Appellant's invented this invention under appeal, many consumers and merchants—particularly those engaged in e-commerce—received inadequate or outdated commercial data. Application, page 9, line 21 to page 10, line 2. The present invention overcame several significant problems in the prior art, such as:

- Consumers' need to quickly locate the best desired merchants (Application, page 3, lines 4-12);
- Merchants' needs for dynamically monitored consumer and market information (Application, page 3, lines 13-21);
- High costs and inefficiencies in traditional consumer and marketing survey methods (Application, page 4, line 1 to page 5, line 22);
- Significant time delays in processing and evaluation survey data once it was obtained (Application, page 6, lines 1-17); and
- Critical problems in conducting remedial consumer surveys (Application, page 6, line 18 to page 7, line 4).

The assignee of the present application (through its predecessor), developed and implemented a novel system for providing timely and accurate information relating to sales, marketing, consumer satisfaction, and other commercial activities of participating businesses. Application, page 7, lines 5-18. This system essentially employs online consumer surveys and electronic data processing methods to report processed survey data as information valuable to participating merchants. *Id.* This system offers considerable, compelling advantages over traditional paper and telephonic consumer surveys. Application, page 7; line 19 to page 8, line 3. While the system addressed these disadvantages, the dynamics of the e-commerce marketplace demand faster and

more accurate data gathering, processing, evaluation, and reporting of data and information. Application, page 8, lines 3-7.

The present invention builds on this past work by providing a novel data processing system that can discern trends and otherwise provide results based on a combination of novel processing modules. Application, page 8, line 19 to page 9, line 4. For example, inadequately small or noisy data sets often lead to inaccurate results, so conventional statistical evaluations favor gathering large amounts of data over time. Application, page 8, lines 8-18. However, merchants are under immense pressure in a rapidly changing e-commerce marketplace to acquire sound information correctly identifying consumer and market trends as quickly as possible. *Id.* The present invention resolves this dilemma by providing a system for processing data samples—even small or noisy data samples—into reliable consumer and market information based around various combinations or arrangements of the following components:

- A module for stabilizing small or noisy data samples;
- Modules that process data to provide useful statistical information and trends.
- Alarm modules that alert users to anomalous data values;
- Predictor modules that use recent historical and statistical data to predict future growth of a population to a maximum attainable level; and
- A dynamic measurement indicator that conveys to users of a system levels of predefined and ongoing activity occurring on another system.

Certain embodiments of the invention are summarized on pages 10-18 of the Application. See also page 9, lines 19. The environment in which the present invention may operate is as follows. Essentially, a consumer completes a survey questionnaire (see, e.g., FIGS. 1 and 2), and this raw data is processed and evaluated by the system of the present invention (see, e.g., FIG. 3). For example, rapidly acquired, time-sensitive consumer data often is based on small sample sizes and can provide very noisy data. If such raw data is sent through a statistical information processing module, the resulting information can be inaccurate and misleading, which may not only be worthless to a merchant, but also potentially damaging if the merchant bases important business decisions on the misleading conclusions. However, coupling a data stabilization module to the system can smooth out the data before it is statistically processed, thus providing valuable information that is both accurate and time-sensitive. Further coupling saturation limit forecasting or alarm modules to the system can provide important

feedback during the data gathering and information process, even in real time. Prior to the present invention, e-commerce consumers and merchants had to chose between accurate information that was old (or even outdated), or timely information that was potentially inaccurate and misleading. Now, however, thanks to Appellant's invention, consumers and merchants in the e-commerce marketplace have accurate, time-sensitive information on which to base their commercial and business decisions.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Appellant's representatives assent to the grouping of claims based on the grounds of rejection stated in the Office action dated August 23, 2004. This brief includes responses to every ground of rejection stated in this latest Office action (see M.P.E.P. § 1206), namely:

1. Claims 4-6, 8-11, 13-17, 22-24, 27, and 31 were rejected as allegedly unpatentable under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Appellant regards as the invention.
2. Claims 89-95 were rejected as allegedly unpatentable under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter, particularly because independent claims 89 and 90 produce a useful result that actually is not required to be used.
3. Claims 1-3, 8-11, 13-15, 19, 23, 51, 53-55, 62, 64-66, and 89-93 were rejected as allegedly unpatentable under 35 U.S.C. § 103(a) over Papierniak et al.'s U.S. Pat. No. 6,128,624 in view of Lee et al.'s U.S. Pub. No. 2002/0072951 and further in view of Decker's U.S. Pat. No. 6,430,305.
4. Claims 4-7, 17, 18, 20, 22, 24, 27, 31, 57, 58, and 60 were rejected as allegedly unpatentable under 35 U.S.C. § 103(a) over Papierniak et al.'s U.S. Pat. No. 6,128,624 in view of Lee et al.'s U.S. Pub. No. 2002/0072951, further in view of Decker's U.S. Pat. No. 6,430,305, and further in view of Abu El Ata's U.S. Pat. No. 6,560,569.

5. Claims 16, 63, 67, 94, and 95 were rejected as allegedly unpatentable under 35 U.S.C. § 103(a) over Papierniak et al.'s U.S. Pat. No. 6,128,624 in view of Sundaresan's U.S. Pub. No. 2003/0033299.

For sake of clarity and brevity, arguments presented against each grounds of rejection refer only to the broadest claim from each group of claims stated in each ground of rejection. Appellant assumes that the Board will select the broadest claim in each group and will consider only that claim. See M.P.E.P. § 1206. If the Board considers any other claims from a group, Appellant's representative requests the opportunity to submit supplemental arguments for patentability of such claims.

ARGUMENT

1. Claims 4-6, 8-11, 13-17, 22-24, 27, and 31 are patentable under 35 U.S.C. § 112, second paragraph, because Appellant has submitted an amendment that removes this issue from appeal.

The Examiner rejected claims 4-6 under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for having insufficient antecedent basis for the element "the presentation server." Each of claims 4-6 depends directly from claim 1. Appellant has removed this issue from appeal by amending claims 4-6 to conform to the language of claim 1.

The Examiner also rejected claim 8 under 35 U.S.C. § 112, second paragraph, alleging that the element "the module" was vague because it did not refer to one of the plurality of modules listed in the claim. Appellant has removed this issue from appeal by amending claim 8 to more clearly specify the intended module.

2. Claims 89-95 are patentable under 35 U.S.C. § 101 because the claimed invention is a presentation server (a machine) that produces a concrete, tangible, and useful result, regardless of whether that result is ever observed.

A machine claim is statutory when the machine, as claimed, produces a concrete, tangible, and useful result. *State Street Bank & Trust Co. v. Signature Financial Group Inc.*, 149 F. 3d 1368, 1373, 47 U.S.P.Q.2d 1596, 1601 (Fed. Cir. 1998).

Claims 89 and 90 are machine claims because each is directed to a presentation server that includes web pages containing data or information derived from certain processing modules.

As Appellant previously stated during prosecution, the present invention produces useful, concrete, and tangible results. See, e.g., Appellant's Amendment and Response to Office Action Dated December 9, 2003, submitted on 14 May 2004, page 17. Each module produces a concrete and tangible result such as smoothing data or indicating to users the activity levels at network sites using the physical system that is configured to present (output) the result. These results are then presentable or presented via the systems, methods, and servers claimed.

The Examiner rejected claims 89-95 under 35 U.S.C. § 101 because neither of independent claims 89 and 90 include an element that information derived from at least two processing modules "is actually presented or accessed, just that it is 'accessible'" (Office Action, 23 August 2004, page 5). The Examiner correctly states that the machines of Appellant's claims 89 and 90 each include web pages containing data or information that has been derived from at least two processing modules, just like the data processing system in *State Street Bank*. These web pages are "accessible to a plurality of remote merchant systems over a computer network" (see Appellant's claims 89 and 90), just as the financial services configuration of the machine in *State Street Bank* would be accessible to the user of its data processing system. The Examiner did not argue that the machines of claims 89 and 90 fail to produce a concrete, tangible, and useful result, only that the result is merely "accessible," rather than being "actually presented or accessed." See Office Action, 23 August 2003, page 5. The Examiner's argument implies that a useful process, machine, manufacture, or composition of matter must actually be used in order to meet the requirements of 35 U.S.C. § 101. However, this interpretation would read a new requirement into 35 U.S.C. § 101. A machine only must be "useful" and capable of providing some identifiable benefit to meet the statutory requirements of 35 U.S.C. § 101—actually *being used* is not a requirement of the statute.

The text of the § 101 states that a patent may be obtained for "any new and *useful* process, machine, manufacture, or composition of matter, or any new and *useful* improvement thereof," (emphasis added) and the courts have never held that any part of an invention must actually be used in order for a patent to be granted. The Federal Circuit has stated that "[t]he threshold of utility is not high: An invention is useful under

section 101 if it is *capable of providing some identifiable benefit.*" *Juicy Whip, Inc. v. Orange Bang, Inc.*, 185 F.3d 1364, 1366, 51 U.S.P.Q.2d 1700 (Fed. Cir. 1999) (emphasis added), citing *Brooktree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 1571, 24 U.S.P.Q.2d 1401 (Fed. Cir. 1992) ("To violate § 101 the claimed device must be totally incapable of achieving a useful result"). Appellant's invention is capable of providing the identifiable benefit of processing a collection of data and presenting the resulting information for later access, similar to the financial data processing system at issue in *State Street Bank.*

The data processing system of the *State Street Bank* (U.S. Pat. No. 5,193,056) was composed of seven structural elements (described using means-plus-function language), which the court summarized as a personal computer including a CPU, a data disk, a logic circuit to prepare the data disk to store selected data, and four data processing elements. See *State Street Bank*, 149 F. 3d at 1371. The Federal Circuit characterized the claimed invention by describing claim 1 of the patent: "[C]laim 1, properly construed, claims a machine, namely, a data processing system for managing a financial services configuration of a portfolio established as a partnership, which machine is made up of, at the very least, the specific structures disclosed in the written description and corresponding to the [...] elements (a)-(g) recited in the claim. A 'machine' is proper statutory subject matter under § 101." *State Street Bank*, 149 F. 3d at 1372. The claimed invention in *State Street Bank* did not include any description of how the resulting data would be displayed, distributed, accessed, or otherwise manipulated outside of the machine itself, or even if the resulting data was in fact accessible outside the data processing system, yet this machine was found to be "proper statutory subject matter under § 101." *Id.*

Section 101 states that a patentable invention must be "useful" only, and the Federal Circuit has repeatedly declined to read into § 101 any requirement that a machine actually be used in order for it to be useful. This interpretation of § 101 is supported by the Office's own Examination Guidelines for Computer-Related Inventions (M.P.E.P. § 2106, 8th ed.).[1] The Guidelines describe one example of a claimed statutory process: "A computerized method of optimally controlling transfer, storage and retrieval of data between cache and hard disk storage devices such that the most frequently used

[1] Appellant understands that these Guidelines do not constitute substantive rule-making and do not have the full force and effect of law, and appellant is not appealing or petitioning any failure by Office personnel to follow the Guidelines. Instead, appellant simply refers to the Office's own guidelines as a persuasive interpretation of the relevant substantive law.

data is readily available." The term "readily available" is synonymous with "accessible," yet the described process still meets the requirements of § 101.

For at least the reasons stated above, Appellant's claims 89 and 90 are patentable under § 101 and the holding of *State Street Bank*. Claims 91-95 depend directly or indirectly from claims 89 and 90. Apparently, the Examiner rejected claims 91-95 as being dependent on a rejected base claim and, therefore, claims 91-95 are patentable for the reasons provided for claims 89 and 90 and for their unique and novel combinations of features recited therein.

3. Claims 1-3, 8-11, 13-15, 19, 23, 51, 53-55, 62, 64-66, and 89-93 are patentable under 35 U.S.C. § 103(a) over Papierniak in view of Lee and further in view of Decker.

3.A. The cited references fail to teach all the elements of Appellant's claims.

3.A.1. The cited references fail to teach Appellant's dynamic activity-level icon module.

A *prima facie* case of obviousness requires three basic criteria:

> First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. *Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.* The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. M.P.E.P. § 706.02(j), citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (emphasis added).

Furthermore, "[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson,* 424 F.2d 1382, 1385, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

The Examiner rejected claims 1 and 8 under 35 U.S.C. § 103(a), alleging that Papierniak discloses most of the elements of these claims. See Office action dated 23 August 2004, pages 5-8. However, as Appellant has consistently argued, Papierniak does not disclose a dynamic activity-level processing module as recited in the claims, and neither do Lee or Decker. See, e.g., Appellant's Amendment and Response to Office Action Dated December 9, 2003, submitted on 14 May 2004, pages 17-18. The

Examiner has failed to establish a *prima facie* case that claim 1 is obvious because the cited references fail to teach or suggest all features of the claim.

The Examiner argued that information from Papierniak's tracking module 300 can be presented to a user via a personalized user interface. The Examiner inferred that Papierniak's personalized generically described user interface is the same as Appellant's dynamic activity-level icons. The Examiner cited column 14, lines 18-21 and column 9, lines 36-42 of Papierniak as the basis for this inference. Office action dated 23 August 2004, page 5. Column 14, lines 18-21 of Papierniak provides only a vague and very general description of tracking data:

> tracking module (WebTrack) 300: systems to find, search, collect and capture detailed customer Web/Internet and/or electronic commerce usage and demographics data.

Column 9, lines 36-42 of Papierniak describes how its invention could be used to manage Internet and/or e-commerce based applications from one of three perspectives:

> Business Operations Management to monitor and understand:
> Key business metrics (revenue, expenses, profitability, subscriber base).
> Factors that impact quality of service.
> The impact of marketing initiatives or competitive influences.

These generic descriptions fail to provide any detailed information about Appellant's dynamic activity-level icon module such as how that information arrives at a user interface or how it is presented on the user interface.

As described on pages 68-72 of the present patent application, Appellant's dynamic activity-level icon module is "a processing module that relates to the display of a dynamic icon that indicates to the user of a remote computer system some level of activity elsewhere in the system." The activity processed by this module and displayed as a dynamically changing icon could be current or recent buying activity for particular merchant (e.g., items purchased, sale prices, quantities purchased), all transactions (or subcategories of transactions) taking place at a merchant's site, consumer ratings information, level of Internet traffic at a merchant's website, special promotions or discounts, and other consumer-related information. A single dynamic icon can be displayed to a user, or plural dynamic icons can be displayed. One exemplary dynamic is a dot that grows or shrinks in size as the corresponding activity level rises or falls. However, the dynamic icon can be virtually any other type of icon such as a numerical value, textual description of the activity, graphic image that connotes a level of activity (e.g., a colored dot), an aural indicator that verbally describes some level of activity, or

any other suitable dynamic icon. Application, pages 68-72 and FIG. 18. The Papierniak reference fails to teach any of these features.

Furthermore, one of ordinary skill in the art reading the above-cited sections of Papierniak would arrive at only a general suggestion to find, search, and collect *customer data* as it relates to a the *business operations* (e.g., key business metrics such as revenue, expenses, profitability, and subscriber base; factors that affect quality of service; and the effects of marketing initiatives or competitive influences) of a *single* network site. There is no teaching or suggestion to dynamically and iconically displaying relative levels of *merchant activity* from a *plurality of network sites for different merchants*.

In contrast to Papierniak's generic descriptions, Appellant's claim 1 recites a "dynamic activity-level icon module *for iconically indicating* to the user of a remote computer system *relative levels of activity at network sites for different merchants* offering competitive goods or services" (emphasis added). Similarly, claims 8, 51, 89 and 90 have been amended to recite "a dynamic activity-level icon module for iconically indicating to the user of a remote computer system a level of activity at *each of a plurality of merchant network sites, the module automatically causing the indication of activity to be sent to the remote computer system upon user access to an electronic page comprising a listing of a plurality of merchants*" (emphasis added). These specific details are not disclosed in Papierniak or any other cited reference.

In view of the foregoing, all claims are patentably distinct over Papierniak and should be allowed.

3.A.2. The cited references also fail to teach Appellant's data stabilizer module, and in fact, teach away from Appellant's data stabilizer.

Claim 1 includes the feature of "a data stabilizer processing module for smoothing noisy or variable data using a computational solution of a minimum variance Bayesian estimation method ... ." This feature is discussed on pages 42-56 of the application. The following excerpts highlight just a few characteristics of the data stabilizer processing module:

> A central component of the schema of Fig. 7 is an Extended Kalman Filter or ("EKF"). The EKF is detailed in Fig. 8. Generally, the EKF uses a computational (recursive) solution of the minimum variance Baysian estimation method. The EKF is powerful in several aspects: it supports estimations of past, present, and even future states. It can do so even when the precise nature of the

> modeled system is unknown. In addition to smoothing noisy data, evaluating small samples of data, and providing a basis for estimations, the EKF also provides a method of weighting data values according to the recency or level of noise corruption of the data. This may be important because, for example, data collected in a later portion of a data collection interval (data window) is likely to be more indicative of present trends than is data collected at the earlier portion of the interval (older data). Application, page 43, lines 9-20.
>
> In one preferred embodiment, a true rating *A* is determined using an adaptation of an Extended Discrete Kalman filter. It is to be understood that the following embodiment is presented for purposes of illustration not limitation. Persons skilled in the art will appreciate that other adaptations of Kalman filters are within the scope and spirit of the present invention. In connection with the following discussion, reference may be made to Figs. 7 and 8, which help illustrate the principles being discussed. Hereinafter, a processing module that can smooth noisy or variable data using a computational (recursive) solution of the minimum variance Baysian estimation method is referred to as a Data Stabilizer or "DS" for short. Application, page 44, lines 8-17.

The Office action cites column 4, lines 19-33 of the Decker reference as disclosing Appellant's data stabilization module:

> At step 68 Psig and Pnon-sig are combined to yield P, and P is evaluated at step 70 to compute the financial risk of the transaction. At step 72, it is determined whether the risk of accepting the transaction is less than the risk of denying the transaction. If the risk of accepting the transaction is less than the risk of denying the transaction, then the transaction is allowed at step 74. If the risk of accepting the transaction is greater than the risk of denying the transaction, then the transaction is denied at step 74. After completion of either of steps 72 or 74, the history database is updated at step 78.
>
> The method of the present invention operates according to the known statistical problem of regression. If it is assumed that the probability estimates are independent, then there are pretty straightforward techniques for computing a best guess by Bayesian analysis.

However, the Examiner has consistently failed to explain why this single mention of "Bayesian analysis" in Decker discloses the data stabilization module of claim 1 as described in the specification. Decker describes none of the features of Appellant's data stabilization module. Decker does not describe smoothing noisy or variable data during ecommerce data collection, only "computing a best guess" as a basis for financial risk assessment in fraud detection, which is a completely different and distinct use of algorithm statistics and Bayesian analysis from that recited in the claims and discussed in the specification.

The term "Bayesian" describes a general concept of statistical analysis based on Bayes Theorem, the work of 18th Century British mathematician Thomas Bayes, and is broadly employed in thousands of scientific, sociological, and technological fields. One accepted dictionary definition of "Bayesian" is "being, relating to, or concerned with a theory (as of decision making or statistical inference) involving the application of Bayes'

theorem and the use of probabilities based on prior knowledge and accumulated experience." Merriam-Webster Online dictionary (http://www.m-w.com/; January 25, 2004). An encyclopedia article describing Bayesian probability and its applications is appended in Appendix B. Essentially, "Bayesian analysis" describes any statistical method of using prior knowledge to assess the probability of some future event that can be employed in any endeavor requiring some statistical analysis. This method can be implemented mathematically in a myriad of ways in a myriad of applications. The appropriate implementation for one application may be inappropriate for another.

Given such a nebulous and far-reaching conceptual framework, Decker's single use of "Bayesian analysis" teach or suggest Appellant's data stabilization module to one of ordinary skill in the art—the term is simply too indefinite as used in Decker to enable any use suitable for smoothing of noisy data. Simply reading "Bayesian analysis" would not lead one of ordinary skill in the art directly to Appellant's data stabilization module or the concept of smoothing noisy data using "*a computational solution of a minimum variance Bayesian estimation method*" as recited in Appellant's claim 1, which is a distinct kind of Bayesian analysis. In short, the Examiner's position is akin to finding a reference stating that "geometry" can be used in solving a civil engineering problem and then rejecting a claim that includes a specific theory of geometry not disclosed in the reference.

Furthermore, Decker expressly teaches away from the use of Bayesian methods:

> The method of the present invention operates according to the known statistical problem of regression. If it is assumed that the probability estimates are independent, then there are pretty straightforward techniques for computing a best guess by Bayesian analysis. Those techniques are well known in the literature. *However, typically those probability estimates will not be completely independent, so regression methods that better handle correlated inputs are preferred*. Column 4, lines 29-36 (emphasis added).

One of ordinary skill in the art reading Decker would be led away from using any type of Bayesian analysis at all and, instead, would be led toward using regression methods—a different type of statistical analysis.

For at least these reasons, Decker fails to disclose the data stabilization module of claim 1, a fault that is not cured by either Papierniak or Lee. See Office action, page 6 ("Neither Papierniak nor Lee et al. disclose at least two processing modules including a data stabilizer processing module for smoothing noisy or variable data using a computational solution of a minimum variance Bayesian estimation method"). Therefore, the § 103 rejection based on Decker is improper and should be withdrawn.

3.B. Even if the cited references happened to disclose all elements of Appellant's claims, the references provide no suggestion or motivation to combine their teachings, and the Examiner has not supported with documentary evidence the assertion that such suggestion or motivation can be found in the common knowledge generally available to one of ordinary skill in the art.

As stated above, a *prima facie* case for obviousness has three basic criteria, including a teaching or suggestion to make the claimed combination. M.P.E.P. § 706.02(j), citing *Vaeck,* 947 F.2d 488, 20 USPQ2d 1438. The Examiner has the initial burden to provide some suggestion of the desirability of doing what Appellant has done by at least presenting a convincing line of reasoning as to why one of ordinary skill in the art would have found the claimed invention obvious in light of the teachings of the references. M.P.E.P. §706.02(j), citing *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). The rationale to combine or modify the references cited in an obviousness rejection must come from one of eight sources:

- An express statement in the prior art;
- An implicit disclosure in the prior art;
- Reliance logic and sound scientific theory;
- A similar rational from a prior legal decision having similar facts;
- An overlap or optimization of ranges;
- The selection of a known material based on its suitability for its intended use, the combination of two compositions known to be useful for the same purpose, or substituting equivalents known for the same purpose;
- The obviousness of a species when the prior art teaches a genus; or
- Close structural similarity between chemical compounds.

M.P.E.P. § 2144; internal citations omitted.

In the present case, the Examiner offers a conclusory statement asserting the motivation to combine the references as:

> Papierniak, Lee et al., and Decker, are all concerned with marketing data collection, [and] therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include a competitor analysis and data stabilizer processing module in Papierniak, as seen in Lee et al and Decker, respectively, as additional means of analyzing collected data, thereby increasing the robustness of the Papierniak system. Office action dated 23 August 2004, page-7.

This statement directly contradicts the Examiner's assertion on page 6 of the Office action that neither Papierniak nor Lee discloses a data stabilization module. However, Appellant's representatives found no disclosure of a data stabilization module in Lee,

and the Examiner cites only Decker asserting that the data stabilization module is somehow disclosed in these references.

Furthermore, the Examiner has not cited either an express statement or implicit disclosure in the prior art as the basis for this obviousness rejection. Nor has the Examiner relied on scientific theory, prior legal precedent, the selection of a known material based on its suitability for its intended purpose, a combination of two compositions known to be useful for the same purpose, or substituting equivalents known for the same purpose. The rejected claims are not directed to chemical compounds or ranges, and the Examiner has not asserted that the data stabilizer is some obvious species of a known genus. Therefore, the Examiner can rely only on the common knowledge of those skilled in the art as the basis for the obviousness rejection, and the Examiner has not properly done so.

The Examiner made a factual finding that one of ordinary skill in the art at the time the application was filed would have found it obvious to add the Bayesian analysis of Decker[2] to Papierniak to arrive at Appellant's claim 1 simply because both references " are concerned with marketing data collection." As stated below, Decker has little (if any) relation to marketing data collection—Decker relates to validating commercial transactions. One of ordinary skill in the art at the time Appellant filed this present patent application who read Papierniak would not be led to Decker any more than someone attempting to invent a better way to gather census data would be led to anti-forgery methods for drivers' licenses.

Under the Administrative Procedures Act, a "substantial evidence" standard is applied to such findings of fact. M.P.E.P. § 2144.03, citing In re Gartside, 203 F.3d 1305, 1315, 53 USPQ2d 1769, 1775 (Fed. Cir. 2000). The Examiner has offered no documentary evidence supporting her assertion that it would have been obvious to combine Papierniak and Decker simply because both references relate to marketing data collection. In fact, as shown in Section 3.A.2, pages 11-13, Decker does not relate to marketing data collection. The Decker invention is directed to "methods for verifying the identity of a purchaser at a remote location for purposes of credit or cash debit transactions" and has nothing to do with collecting e-commerce data or marketing data generally. Decker's U.S. Pat. No. 6,430,305 (August 6, 2002), column 1, lines 5-9.

[2] This statement is not an admission that Decker discloses Appellant's data stabilization module. As shown in Section 3.A.2, pages 11-13, Decker does not disclose Appellant's data stabilization module. However, even in the hypothetical case where Decker did happen to disclose Appellant's data stabilization module, the

An examiner should take official notice unsupported by documentary evidence where the facts asserted are common knowledge in the art are capable of instant and unquestionable demonstration as to defy dispute. M.P.E.P. § 2144.03, citing *In re Ahlert*, 424 F.2d 1088, 1091, 165 USPQ 418, 420 (CCPA 1970) and *In re Knapp Monarch Co.*, 296 F.2d 230, 132 USPQ 6 (CCPA 1961). More importantly, asserting "common knowledge" in the art without evidentiary support in the record is never appropriate:

> It is never appropriate to rely solely on "common knowledge" in the art without evidentiary support in the record, as the principal evidence upon which a rejection was based. [*In re Zurko*, 258 F.3d 1379, 1385, 59 USPQ2d 1693. 1697 (Fed. Cir. 2001).] ("[T]he Board cannot simply reach conclusions based on its own understanding or experience-or on its assessment of what would be basic knowledge or common sense. Rather, the Board must point to some concrete evidence in the record in support of these findings."). While the court explained that, "as an administrative tribunal the Board clearly has expertise in the subject matter over which it exercises jurisdiction," it made clear that such "expertise may provide sufficient support for conclusions [only] as to peripheral issues." *Id.* at 1385-86, 59 USPQ2d at 1697. As the court held in *Zurko*, an assessment of basic knowledge and common sense that is not based on any evidence in the record lacks substantial evidence support. *Id.* at 1385, 59 USPQ2d at 1697. See also *In re Lee*, 277 F.3d 1338, 1344-45, 61 USPQ2d 1430, 1434-35 (Fed. Cir. 2002) (In reversing the Board's decision, the court stated " 'common knowledge and common sense' on which the Board relied in rejecting Lee's application are not the specialized knowledge and expertise contemplated by the Administrative Procedure Act. Conclusory statements such as those here provided do not fulfill the agency's obligation..The board cannot rely on conclusory statements when dealing with particular combinations of prior art and specific claims, but must set forth the rationale on which it relies."). M.P.E.P 32144.03

Though the decision in *Zurko* applied to this Board, the *Zurko* reasoning extends to Examiners in the Office as well. Furthermore,

The Examiner has not set forth a rationale for combining Papierniak and Decker, the Examiner has offered only the (incorrect) conclusion that both "are concerned with marketing data collection." Even if this conclusion were true, the Examiner has not pointed to some concrete evidence to support this conclusion—the Examiner has only reached this conclusion based on her own understanding, her own experience, or her own assessment of what would be basic knowledge or common sense in the art. See also M.P.E.P. §2144.08: "Explicit findings on motivation or suggestion to select the claimed invention should also be articulated in order to support a 35 U.S.C. 103 ground of rejection. [*In re Dillon*, 919 F.2d 688, 693, 16 USPQ2d 1897, 1901 (Fed. Cir. 1990) (*in banc*)]; *In re Mills*, 916 F.2d 680, 683, 16 USPQ2d 1430, 1433 (Fed. Cir. 1990).

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asserted *prima facie* case of obviousness still would fail for lack of a motivation to combine Papierniak, Decker, and Lee.

Conclusory statements of similarity or motivation, without any articulated rationale or evidentiary support, do not constitute sufficient factual findings." Therefore, the Examiner has failed to establish a *prima facie* case that claim 1 is obviousness in light of the combination of Papierniak, Lee, and Decker.

3.C. Furthermore, the references used to construct the *prima facie* case for obviousness do not come from analogous arts.

Even if Decker happened to disclose Appellant's data stabilization module, and *even if* documentary evidence existed supporting the assertion that the motivation to combine Decker with the other references was found in the common knowledge of those ordinarily skilled in the art at the time the application was filed, the obviousness rejection still would be improper because Decker does not relate to an analogous art.

A reference used to establish an obviousness rejection must either be in the field of Appellant's endeavor or reasonably pertinent to the particular problem the Appellant addressed. M.P.E.P. § 2141.01(a), citing *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992) and *In re Deminski*, 796 F.2d 436, 230 USPQ 313 (Fed. Cir. 1986); *In re Clay*, 966 F.2d 656, 659, 23 USPQ2d 1058, 1060-61 (Fed. Cir. 1992). "A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem." *In re Clay*, 966 F.2d 656, 659, 23 USPQ2d 1058, 1060-61 (Fed. Cir. 1992); see also *Wang Laboratories Inc. v. Toshiba Corp.*, 993 F.2d 858, 26 USPQ2d 1767 (Fed. Cir. 1993) and *State Contracting & Eng'g Corp. v. Condotte America, Inc.*, 346 F.3d 1057, 1069, 68 USPQ2d 1481, 1490 (Fed. Cir. 2003) (where the general scope of a reference is outside the pertinent field of endeavor, the reference may be considered analogous art if subject matter disclosed therein is relevant to the particular problem with which the inventor is involved). The Decker reference is not analogous art because its subject matter logically would not have commended itself to an inventor's attention in considering the same problem addressed in the present application, nor is Decker relevant to the particular problem.

Appellant's invention solves several problems related to collecting, evaluating, and presenting data, and generating useful information, related to e-commerce transactions, such as:

- Helping consumers quickly locate the best merchants for their needs;
- Helping merchants quickly obtain the most current and accurate marketing information;
- Overcoming problems inherent in traditional methods of administering and processing consumer surveys;
- Reducing the financial costs of consumer surveys;
- Reducing the time delays of consumer surveys to improve their accuracies;
- Assisting merchants wishing to take remedial action in the face of such surveys; and
- Facilitating subsequent consumer surveys.

See, e.g., application, page 2, line 16 to page 7, line 4. With the present invention, Appellant continued to address the problems of inaccuracies arising in the statistical analysis of e-commerce data resulting from inadequately small samples or noisy samples using a unique and novel combination of features. Application, page 8, line 8 to page 9, line 4.

The Decker invention does not concern itself with data or information *about* a commercial transaction; instead, Decker is concerned with whether a commercial transaction is valid. Decker's U.S. Pat. No. 6,430,305 (August 6, 2002), column 1, lines 47-49. The Decker reference discusses remote verification of identity for various purposes (security, credit card transaction verification, automated teller machine transaction verification, etc.) including identification of physical characteristics and other indicia (fingerprints, retinal patterns, and signature verification). *Id.* at column 1, lines 11-17. At most, the Decker reference relates to the external, objective validity of a commercial transaction as a whole, rather than the internal, subjective nature and content of a commercial transaction, such as quantity and type of goods or services ordered, the costs of those goods or services, consumer satisfaction, merchant ratings, and consumer demographic information. See, e.g., application, figures 1a-g and 2a-b. By analogy, Appellant can create better automotive evaluations for *Car & Driver*, *Consumer Reports*, and other magazines—evaluations that will help consumers understand automakers and their products and help automakers understand the consumer marketplace—while Decker is concerned solely with the accuracy of Vehicle Identification Numbers (VINs). While the two different problems independently addressed in Decker and the present application are not mutually exclusive, an inventor would not look to Decker as a solution to the problems identified by the Appellant. Therefore, the Examiner's *prima facie* case also fails for lack of analogous arts in the cited references.

4. Claims 4-7, 17, 18, 20, 22, 24, 27, 31, 57, 58, and 60 are patentable under 35 U.S.C. § 103(a) over Papierniak in view of Lee, further in view of Decker, and further in view of Abu El Ata.

Claim 4, the broadest claim in this group, depends from claim 1. As stated above in Section 3, the § 103 rejection of claim 1 based on Papierniak, Lee, and Decker is inappropriate because the Examiner has failed to state a *prima facie* case of obviousness. Therefore, claim 1 is patentable over Papierniak, Lee, and Decker, and claim 4 also is patentable over these three references for the same reasons. Furthermore, claim 4 is patentable over the Papierniak, Lee, Decker, and Abu El Ata because Abu El Ata does not cure the deficiencies present in the lack of a *prima facie* of obviousness based on just Papierniak, Lee, and Decker.

4.A. Neither Decker nor Abu El Ata is from an analogous art

Including the Decker reference in this obviousness rejection is improper for the same reasons that it was improper to include Decker in the previous obviousness rejection.[3]

The Abu El Ata reference describes the construction and testing of models for an information system (a system of computer hardware and software components used for tracking, processing, and recording business information). See Abu El Ata, U.S. Pat. No. 6,560,569 (May 6, 2003), column 1, lines 22-42; column 1, lines 45-55; column 3, lines 39-45; and FIGS. 2-3 and 6. The Abu El Ata reference relates to problems faced by managers of large and complex information systems that suffer from inefficiencies or "bottlenecks" that slow or even stop the information system. *Id.* at column 1, lines 27-34. Previously known monitoring systems helped information system managers to identify these bottlenecks and determine where additional resources would be needed in an information system to correct the inefficiencies. *Id.* at column 1, lines 39-42. However, Abu El Ata goes beyond simply monitoring a system and offers a way for creating a model for a system that accurately models all its components even before such a new information system actually exists. *Id.* at column 1, lines 45-55. For the same reasons provided in the discussion of Decker,[4] the art of designing an information system is not analogous to collecting e-commerce data from an information system. To continue the

[3] *Supra,* Section 3.A.2, pages 11-13.
[4] Id.

analogy provided above,[5] Appellant's invention can be thought of as a new and better way to gather performance characteristics about different automobiles. In contrast, Abu El Ata's invention provides a way for automakers to virtually model different assembly line configurations before their factories are built.

An inventor in Appellant's position at the time the present application was filed, endeavoring to find a better way to collect, evaluate, and present e-commerce data, and generate information from that data, would not logically have sought out references describing how to model information systems carrying that e-commerce data. Appellant was attempting to find a better way to draw water from an existing well, not a better way to mathematically model well drilling and construction before its even begun. Like Decker, Abu El Ata is not from an analogous art, and therefore, it was improper for the Examiner to use Abu El Ata in this § 103 for the same reasons given for Decker.[6]

4.B. The cited references fail to teach all the elements of Appellant's claims.

As stated above, the combination of Papierniak, Lee, and Decker fails to teach all the features of Appellant's claim 1.[7] Abu El Ata fails to correct this deficiency because it fails to teach the features missing from the combination of the other three references. Claim 4 depends from claim 1 and includes the additional features of a system having at least three processing modules from the group stated in claim 1 and a presentation server "for presenting selected items of data following sequential processing of data by the at least three selected processing modules."

The Examiner correctly states that Papierniak does not disclose Appellant's saturation limited forecasting module or the alarm filter module. Office action (August 23, 2003), page 10. The Examiner still argues that claim 4 is rendered obvious by the combination of Papierniak, Lee, Decker, and Abu El Ata because

> Abu El Ata discloses models used to determine estimates for business and growth rates, including transaction rate and growth of volume (i.e. saturation forecasting, column 12, lines 24-32). Abu El Ata also discloses computational results (i.e. data rates) compared to a theoretically best or ideal case, with any deviation diagnosed (i.e., alarm filter, column 10-11, lines 66-67 and 1-4).

Claim 1 includes the feature of "an alarm filter module for monitoring data rates and sending a signal based on deviations from desired thresholds from a normative rate ... ." The alarm filter monitors data rates along any data channel and, while monitoring,

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[5] *Supra,* Section 3.C, page 18.
[6] *Supra,* Section 3.C, pages 16-18
[7] *Supra,* Section 3.A, pages 8-13

initiates an alert when the actual data rate deviates from an expected, normative rate. Application, page 56, lines 16-28. For example, the alarm filter monitoring a data channel for the daily response rate to a merchant's questionnaire could initiate an alert when the monitored response rate drops significantly from the expected normative response rate. Application, page 56, line 29 to page 57, line 11. The merchant could then investigate why the survey response rate dropped significantly—perhaps consumers are purchasing goods elsewhere or there is a technical error in loading the survey onto a web page. Application, page 57, lines 11-21.

The Examiner asserted that Abu El Ata discloses Appellant's alarm feature at column 10, line 66 to column 11, line 4. However, Abu El Ata actually discloses a method of calibrating its modeling system:

> The initial model 20 is then calibrated by comparing estimates obtained from the model 20 against information and benchmarks contained in the component library 50, and, if necessary, the estimation process 78 is repeated (see the previous discussion on the calibration process for FIG. 5).
>
> In one embodiment of the invention, this calibration process is accomplished through three steps as described in the following:
>
> The first step is a walk through in which each assumption used in the model construction is validated.
>
> The second step consists of comparing the computed values of the model 20, 22 without any distinction of the mode of operation in each class of users (Batch, Transactional, Real Time) to the measured values. Usually, through a fully automated iterative process, the information design system 10 is able to provide very acceptable accuracy for the computed model 20, 22.
>
> *The third step consists of moving different classes of applications, each in its mode of operation category, to the appropriate place in the model structure. Typically, computation results obtained are in agreement with those obtained in the second step, but this is not always the case. In many cases the model 20, 22 computed in this step is theoretically a best or ideal case of the reality and any deviation should be diagnosed. The results of the model 20, 22 show either an agreement or a faster response. If the results are a faster response, these results are an indication of non-modeled phenomenon, non-captured events or workload independent overhead.*
>
> After the initial model 20 is calibrated, additional models 22 are then constructed in an assessment and prediction process, calibrated and evaluated based on their performance. This process may lead to changes in the assumptions and estimates in an estimation change process 82 made for the proposed information system (see also FIG. 5). A preferred model selected from the initial model 20 and additional models 22 is then implemented as an actual information system 74. The performance of the actual information system 74 is compared with the predicted performance of the preferred model in a verification process 86. If the performance is not what is expected, then the whole process may return to the initial steps of designing an architecture for a target system 70 and a new round of estimates using the estimation process 78.

Abu El Ata, U.S. Pat. No. 6,560,569 (May 6, 2003), column 10, line 47 to column 11, line 23 (emphasis added to column 10, line 66 to column 11, line 4, cited by the Examiner as the basis for the obviousness rejection). This calibration method describes how the

modeling process for an information system can be improved to more accurately model the eventual information systems that actually will be built. The calibration method compares *computation results* obtained in the third step with the *computation results* of the second step. In contrast, Appellant's alarm filter monitors an ongoing, dynamically changing *data rate* flowing throw a data channel—a feature not described in Abu El Ata. Nor does Abu El Ata disclose Appellant's saturation limited forecast module.

Appellant's saturation limited forecast module uses "available historical or recently captured data along with an estimated and/or available saturation population function as the basis for an algorithm that defines the growth of the population to a maximum attainable level." Application, claim 1. This module employs a saturation limited forecast model

> that forecasts the growth of a population from a set of early observations. This model may be integrated into system 5 as a processing module 22. The SLF Model may be used to predict various values of interest to businesses. The forecasting methodology for e-commerce measures and consumer behaviors may be advantageously based on the saturation limited forecasting model of the present invention. For example, the model may be used to predict sales volumes for a category or categories of goods or services; number of females over the age of 18 participating in e-commerce; number of merchants offering a certain category of goods or services. Values for e-commerce measures and consumer behaviors, such as the foregoing may be referred to herein as "e-commerce populations." An example of an SLF Model is more specifically shown in Fig. 10 as processing module 222.
>
> More specifically, the SLF processing module uses available recent historical data along with an estimated and/or available saturation "population" function as the basis for a differential equation that defines the growth of a "population" to a maximum attainable level.

Column 12, lines 15-32 of Abu El Ata describes the use of certain types of estimates as part of the descriptive input used as the basis for modeling an information system:

> The descriptive input 12 also includes estimates determined by an estimation process 78. In one embodiment, a designer of the information system makes these estimates and enters them into a user interface provided by the input module 16 of the information design system 10. In another embodiment, the information design system 10 provides an analytic or expert system module which makes these estimates based on the input 12 and information obtained from the component libraries 50.
>
> One set of estimates is for business volume and growth rate. For example, these estimates include the number of transactions per business process, the weight of transaction type per business process, and the growth in business volume per year. The growth in business volume per year is included to make determinations later about whether the proposed information design system can handle a growth in volume readily (see the discussion of the aging ratio provided later).

See also Abu El Ata, U.S. Pat. No. 6,560,569 (May 6, 2003), FIGS. 1, 3, and 7. Examples of business volume cited in Abu El Ata include the number of debit/credit

transactions, the number of trades (such as matched orders in a stock exchange), and/or number of bills. Abu El Ata, U.S. Pat. No. 6,560,569 (May 6, 2003), column 11, lines 29-33. The business growth rate estimate is used to predict how long a particular information system might efficiently handle the requirements of the business using the information system. Id. at column 12, lines 24-32 and column 15, lines 32-57. The estimates of business volume and growth rate are part of the descriptive input used to model possible information systems for that particular business. To continue with the previous analogy, if an information system is analogous to a well of water, then estimates of business volume and growth rates would be analogous to estimates for rainfall amounts and frequencies—part of the descriptive input used to determine how quickly a well of a certain size, shape, and depth would fill up, thus requiring extensions and modifications, or an entirely new well.

The Abu El Ata invention uses estimates of business volume and growth rate to determine the business transactions would overflow a modeled computer system (like a well overflowing with water). Abu El Ata does not speak of the use of saturation population function as the basis of any algorithm, nor does the reference describe any algorithm that defines growth of a population to a maximum attainable level.

In contrast, Appellant's invention uses a saturation limited forecast module to determine when a particular population would reach its maximum attainable level when processing an entire body of e-commerce data. For example, the saturation limited forecast model could be used to determine the maximum sustainable sales volume of computer games among persons aged 18 to 34, or the maximum sustainable number of merchants selling consumer electronics. The Abu El Ata reference relates to business transactions flowing through a business's computer system and how well that information system handles the transaction load; Appellant's invention looks to the maximum attainable level of business transactions as one basis for determining what those transactions mean to the business and consumers. In other words, Appellant's saturation limited forecast module is analogous to estimating the maximum attainable rainfall for a particular geographic area based on wind patterns, temperature data, geological features, land use, humidity fluctuations, and other geological and meteorological information. Abu El Ata does not disclose Appellant's saturation limited forecasting module.

Therefore, for all the reasons stated above, the four cited references fail to teach all features of Appellant's claims, the Examiner has not presented a *prima facie* case of obviousness, and the claims are patentable over the four cited references.

5.C. Even if the four cited references happened to disclose all elements of Appellant's claims, the references provide no suggestion or motivation to combine their teachings, and the Examiner has not supported with documentary evidence the assertion that such suggestion or motivation can be found in the common knowledge generally available to one of ordinary skill in the art.

The Examiner asserts that the motivation to combine the four references—Papierniak, Lee, Decker, and Abu El Ata—existed in the common knowledge within the art at the time the application was filed:

> Papierniak and Abu El Ata are concerned with data manipulation, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include a saturation limited forecasting module, and an alarm filter module in Papierniak, as seen in Abu El Ata, as additional means of analyzing collected data, thereby increasing the robustness of the Papierniak system.

Office action (August 23, 2004), page 11. The legal requirements for finding a suggestion or motivation to combine references are discussed above in relation to the Decker reference.[8] For similar reasons stated in opposition to the Examiner's obviousness rejection based on Papierniak, Lee, and Decker, the Examiner has failed to state a *prima facie* case of obviousness based on Papierniak, Lee, Decker, and Abu El Ata.

Papierniak and Abu El Ata involve data manipulation, but the same could be said about any invention having any element or aspect of computation—including any invention related to the computer or the abacus. Simply stating that both references involve data manipulation is not sufficient to meet the element of a suggestion or motivation to combine the references to establish a *prima facie* case for obviousness. Papierniak relates to

> a computer architecture and method for integrating data elements from Internet service providers (ISP) and commerce service providers (CSP) operational database(s) into predetermined format for supporting collection of Internet and/or electronic commerce data, and more particularly, to a computer architecture and method for integrating data elements from commerce service providers's operational database(s) into predetermined format for supporting

[8] *Supra*, Section 3.B, pages 13-16.

> collection of Internet and/or electronic commerce data over or from the World Wide Web for ISPs and CSPs.

Papierniak et al., U.S. Pat. No. 6,128,624 (October 3, 2000), column 1, lines 8-18. This invention provides a computer system and method for supporting e-commerce data collection based on an ISP's or CSP's own databases. Both the Papierniak invention and Appellant's own invention involved collecting, processing, and analyzing e-commerce data, though the inventions do so in distinctly different ways. In contrast, Abu El Ata's invention relates to designing and modeling computer systems:

> The invention relates to systems and methods for monitoring, managing, and diagnosing information systems, and more particularly to systems and methods for designing and modeling information systems.

Abu El Ata, U.S. Pat. No. 6,560,569 (May 6, 2003), column 1, lines 15-18. The Examiner offers only the conclusory statement that one of ordinary skill in the art would combine these references because they are "concerned with data manipulation." This argument is analogous to asserting that an Olympic figure skating judge would study the coaching and management of hockey teams because judging figure skaters and managing a hockey team both relate to ice rinks. The Examiner has not set forth a rationale for combining Papierniak and Abu El Ata, the Examiner has offered only the (incorrect) conclusion that both "are concerned with data manipulation." Even if this conclusion were true, the Examiner has not pointed to some concrete evidence to support this conclusion—the Examiner has only reached this conclusion based on her own understanding, her own experience, or her own assessment of what would be basic knowledge or common sense in the art. Therefore, this is just one reason why the Examiner has failed to establish a *prima facie* case that claim 4 is obviousness in light of the combination of Papierniak, Lee, Decker, and Abu El Ata.

5. Claims 16, 63, 67, 94, and 95 are patentable under 35 U.S.C. § 103(a) over Papierniak in view of Sundaresan.

5.A. Appellant has sworn behind Sundaresan in a Rule 131 declaration and the Examiner has not stated why this declaration is ineffective to overcome the reference.

Appellant submitted a Rule 131 declaration from the inventor and Appellant, George Rebane, in which he swore behind the filing date of Sundaresan (January 20,

2000). In response to this submission, the Examiner stated that the declaration is "insufficient to establish diligence from a date prior to the date of reduction to practice of the Sundaresan reference" (Office action dated 23 August 2004, page 3). The evidence submitted with the declaration demonstrates a reduction to practice, at least circumstantially, but Appellant is prepared to submit additional evidence showing reduction to practice if necessary.

The declaration was made by the inventor of the claimed subject matter. 37 C.F.R. § 1.131(a); M.P.E.P. § 715.04. The declaration includes the declarant's acknowledgment that willful false statements and the like are punishable by fine or imprisonment or both (18 U.S.C. § 1001)and may jeopardize the validity of the application or any patent issued thereon. 37 C.F.R. § 1.68; M.P.E.P. § 715.04. And the Sandaresan patent does not claim the same patentable invention as the present application. 37 C.F.R. § 1.131(a); M.P.E.P. § 715.

The declaration is supported by two exhibits. Exhibit 1 is an undated set of notes describing a "ThruFlow System" describing Appellant's invention. Exhibit 2 is a draft public announcement of assignee's "E-Kommerce Graph™ or EKG™ service." The background material for this public announcement—dated August 11, 1998—describes the system and methods of the present application. The present invention was conceived at least as early as August 11, 1998, roughly eighteen months prior to when Sundaresan was filed. Therefore, the declaration establishes the priority of Appellant's invention by documented facts, not just allegations. 37 C.F.R. § 1.131(a); M.P.E.P. § 715.07. The transition from a set of notes and background materials to a public announcement at least circumstantially presents facts sufficient to establish Appellant's diligence from conception to reduction to practice.

The Examiner has not stated why she believes Appellant failed to traverse the obviousness rejection based on Papierniak and Sundaresan. Merely stating that the submitted declaration "is ineffective to overcome the Sundaresan reference" is not a complete answer to Appellant's traversal and offers no substantive answer to it. See 37 C.F.R. § 1.104; M.P.E.P. § 707.07 and 707.07(f) ("Where the Appellant traverses any rejection, the examiner should take note of the Appellant's argument and answer the substance of it."). Circumstantial evidence is still factual evidence, and the Examiner has not met her burden of taking note of Appellant's argument and answering the substance of it. *Id.* If the Examiner provides more specific arguments about why the

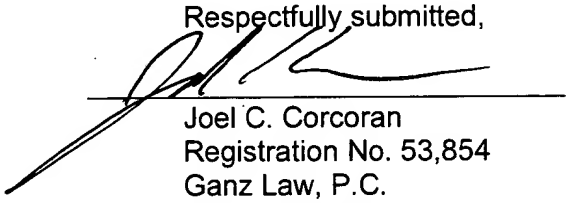
facts presented with this declaration are insufficient, Appellant can submit additional factual evidence to supplement the declaration.

CONCLUSION

For one or more of the reasons set forth above, the Board is respectfully requested to reverse the Examiner's rejection of all claims that currently stand rejected and to confirm the patentability thereof. If any additional fees related to this Appeal Brief or the Amendment filed herewith are due, please charge any such fees, or credit any overpayment, to Deposit Account No. 50-1001.

Respectfully submitted,

Date: May 5, 2005



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Claims Appendix (A)

1. A system, comprising:

a plurality of processing modules configured for performing a predefined set of operations on data received from a data source, at least two processing modules being selected from the group consisting of: a data stabilizer processing module for smoothing noisy or variable data using a computational solution of a minimum variance Bayesian estimation method; a saturation limited forecasting module for using available historical or recently captured data along with an estimated and/or available saturation population function as the basis for an algorithm that defines the growth of the population to a maximum attainable level; a dynamic activity-level icon module for iconically indicating to the user of a remote computer system relative levels of activity at network sites for different merchants offering competitive goods or services; and an alarm filter module for monitoring data rates and sending a signal based on deviations from desired thresholds from a normative rate; and

wherein the system is configured for presenting selected items of data following the sequential processing of data by the at least two selected processing modules.

2. The system of claim 1 wherein the data source comprises one or more remote computer systems.

3. The system of claim 2 wherein the system is adapted to receive and process data related to an online e-commerce transaction.

4. The system of claim 1 wherein at least three of said processing modules are selected and the presentation server is for presenting selected items of data following the sequential processing of data by the at least three selected processing modules.

5. The system of claim 1 wherein four of the processing modules are selected and the presentation server is for presenting selected items of data following the sequential processing of data by the at least four selected processing modules.

6. The system of claim 1 wherein all five of the processing modules are selected and the presentation server is for presenting selected items of data following the sequential processing of data by the at least fice selected processing modules.

7. The system of claim 3 wherein at least three of said processing modules are selected.

8. A system, comprising:

a plurality of processing modules configured for performing a predefined set of operations on data relating to e-commerce transaction received from a first plurality of remote computer systems, at least two processing modules being selected from the group consisting of: a data stabilizer processing module for smoothing noisy or variable data using a computational solution of a minimum

variance Bayesian estimation method; a saturation limited forecasting module for using available historical or recently captured data along with an estimated and/or available saturation population function as the basis for an algorithm that defines the growth of the population to a maximum attainable level; a dynamic activity-level icon module for iconically indicating to the user of a remote computer system a level of activity at each of a plurality of merchant network sites, the module automatically causing the indication of activity to be sent to the remote computer system upon user access to an electronic page comprising a listing of a plurality of merchants; and an alarm filter module for monitoring data rates and sending a signal based on deviations from desired thresholds from a normative rate;

wherein the system is configured to present to a second plurality of remote computer systems via a computer network a set of items or data generated from the sequential processing of the data by the at least two processing modules.

9. The system of claim 8 wherein the system is configured to receive e-commerce data over the Internet.

10. The system of claim 9 wherein the data generated by the processing modules is presented over the Internet to a second plurality of remote computer systems comprising consumer computer systems.

11. The system of claim 9 wherein the system is configured toto serve a survey questionnaires to first plurality of remote computer systems, the system being configured to receive data supplied in response to a survey and to process the data using the selected processing modules.

13. The system of claim 10 wherein the second plurality of remote computer systems comprise one or more merchant computer systems.

14. The system of claim 10 wherein the second plurality of remote computer systems comprise a plurality of consumer computer systems.

15. The system of claim 10 wherein the system is configured to present the processed data to a plurality of merchant and consumer computer systems.

16. The system of claim 10 wherein the presented data comprises ratings for online merchants, the ratings being based on data received from the first plurality of remote computer systems, wherein the first plurality comprises consumer computer systems.

17. The system of claim 14 wherein at least three of the processing modules are selected for sequential processing of the data.

18. The system of claim 1 wherein one selected processing module comprises a data stabilizer processing module and one selected processing module comprises an alarm filter module.

19. The system of claim 1 wherein one selected processing module comprises a data stabilizer processing module and one selected processing module comprises a dynamic activity-level icon module.

20. The system of claim 1 wherein one selected processing module comprises a data stabilizer processing module and one selected processing module comprises a saturation limit forecasting module.

22. The system of claim 15 wherein one selected processing module comprises a data stabilizer processing module and one selected processing module comprises an alarm filter module.

23. The system of claim 15 wherein one selected processing module comprises a data stabilizer processing module and one selected processing module comprises a dynamic activity-level icon module.

24. The system of claim 15 wherein one selected processing module comprises a data stabilizer processing module and one selected processing module comprises a saturation limit forecasting module.

27. The system of claim 23 further comprising an alarm filter processing module.

31. The system of claim 14 further comprising a dynamic activity-level icon processing module.

51. A computer implemented method, comprising:

capturing data from a a first plurality of remote computers systems over the Internet;

performing a predefined set of operations on data received from the first plurality of computer systems at least two processing modules being selected from the group consisting of: a data stabilizer processing module for smoothing noisy or variable data using a computational solution of a minimum variance Bayesian estimation method; a saturation limited forecasting module for using available historical or recently captured data along with an estimated and/or available saturation population function as the basis for an algorithm that defines the growth of the population to a maximum attainable level; a dynamic activity-level icon module for iconically indicating to the user of a remote computer system a level of activity at each of a plurality of merchant network sites, the module automatically causing the indication of activity to be sent to the remote computer system upon user access to an electronic page comprising a listing of a plurality of merchants; and an alarm filter module for monitoring data rates and sending a signal based on deviations from desired thresholds from a normative rate, the one or more processing modules outputting processed data or information; and

presenting selected items of processed data or information following the sequential processing of the data using the at least two processing modules.

53. The method of claim 51 wherein the captured data relates to e-commerce transactions.

54. The method of claim 53 wherein the e-commerce transactions comprise consumer-merchant transactions.

55. The method of claim 53 wherein the e-commerce transactions comprise business to business transactions.

57. The method of claim 51 wherein at least three of said processing modules are selected.

58. The method of claim 51 wherein four of the processing modules are selected.

60. The method of claim 54 wherein at least three of said processing modules are selected.

62. The method of claim 54 further comprising serving a survey questionnaire to the first plurality of remote computer systems, and, and capturing completed survey data for use in the selected processing modules.

63. The method of claim 62 wherein the first plurality of computer systems comprise a plurality of consumer computer systems and the survey data relates to an online transaction between a consumer and a merchant.

64. The method of claim 54 wherein the first plularity of computer systems comprise one or more merchant computer systems.

65. The method of claim 51 wherein the processed data is presented to a plurality of merchant computer systems.

66. The method of claim 51 wherein the processed data is presented to a plurality of consumer computer systems.

67. The method of claim 66 wherein the data comprises ratings for online merchants.

89. A presentation server that includes web pages containing data or information that has been derived from at least two processing modules selected from the group consisting of: a data stabilizer processing module for smoothing noisy or variable data using a computational solution of a minimum variance Bayesian estimation method; a saturation limited forecasting module for using available historical or recently captured data along with an estimated and/or available saturation population function as the basis for an algorithm that defines the growth of the population to a maximum attainable level; a dynamic activity-level icon module for iconically indicating to the user of a remote computer system a level of activity at each of a plurality of merchant network sites, the module automatically causing the indication of activity to be sent to the remote computer system upon user access to an electronic page comprising a listing of a plurality of merchants; and an alarm filter module for monitoring data rates and sending a signal based on deviations from

desired thresholds from a normative rate, the web pages being accessible to a plurality of remote merchant systems over a computer network.

90. A presentation server that includes web pages containing data or information that has been derived from at least two processing modules selected from the group consisting of: a data stabilizer processing module for smoothing noisy or variable data using a computational solution of a minimum variance Bayesian estimation method; a saturation limited forecasting module for using available historical or recently captured data along with an estimated and/or available saturation population function as the basis for an algorithm that defines the growth of the population to a maximum attainable level; a dynamic activity-level icon module for iconically indicating to the user of a remote computer system a level of activity at each of a plurality of merchant network sites, the module automatically causing the indication of activity to be sent to the remote computer system upon user access to an electronic page comprising a listing of a plurality of merchants; and an alarm filter module for monitoring data rates and sending a signal based on deviations from desired thresholds from a normative rate, the web pages being accessible to a plurality of remote consumer computer systems over a computer network.

91. The presentation server of claim 89 wherein the network comprises the Internet.

92. The presentation server of claim 90 wherein the network comprises the Internet.

93. The presentation server of claim 91 wherein the web pages include evaluation information about merchant performance, the information being derived from data processed by a selected processing module.

94. The presentation server of claim 92 wherein the web pages include ratings of merchant websites, the ratings being derived from data processed by a selected processing module.

95. The presentation of claim 90 wherein the web pages include ratings information for one or more products; the ratings information being derived from data captured from remote computer systems.

Evidence Appendix (B)
Encyclopedia Entry for Bayesian Probability

The appended entry was taken from the Wikipedia online encyclopedia (http://en.wikipedia.org/) on January 26, 2005, and previously submitted with the original appeal brief filed on that same day.

Related Proceedings Appendix (C)

None.

Bayesian probability

From Wikipedia, the free encyclopedia.

Bayesianism is the philosophical tenet that the mathematical theory of probability applies to the degree of plausibility of statements, or to the degree of belief of rational agents in the truth of statements; when used with Bayes theorem, it then becomes Bayesian inference. This is in contrast to frequentism, which rejects degree-of-belief interpretations of mathematical probability, and assigns probabilities only to random events according to their relative frequencies of occurrence. The Bayesian interpretation of probability allows probabilities assigned to random events, but also allows the assignment of probabilities to any other kind of statement.

Whereas a frequentist and a Bayesian might both assign probability 1/2 to the event of getting a head when a coin is tossed, only a Bayesian might assign probability 1/1000 to personal belief in the proposition that there was life on Mars a billion years ago, without intending to assert anything about any relative frequency.

Contents

History of Bayesian probability

"Bayesian" probability or "Bayesian" theory is named after Thomas Bayes, who proved a special case of what is called Bayes' theorem. (However, the term "Bayesian" came into use only around 1950, and in fact it is not clear that Bayes would have endorsed the very broad interpretation of probability now called "Bayesian".) Laplace independently proved a more general version of Bayes' theorem and put it to good use in solving problems in celestial mechanics, medical statistics and, by some accounts, even jurisprudence.

For instance, Laplace estimated the mass of Saturn, given orbital data that were available to him from various astronomical observations. He presented the result together with an indication of its uncertainty, stating it like this: `It is a bet of 11000 to 1 that the error in this result is not within 1/100th of its value'. He would have won the bet, as another 150 years' accumulation of data has changed the estimate by only 0.63%.

The general outlook of Bayesian probability, promoted by Laplace and several later authors, has been that the laws of probability apply equally to propositions of all kinds. Several attempts have been made to ground this intuitive notion in formal demonstrations. One line of argument is based on betting, as expressed by Bruno de Finetti and others. Another line of argument is based on probability as an extension of ordinary logic to degrees of belief other than 0 and 1. This argument has been expounded by Harold Jeffreys, Richard T. Cox, and Edwin Jaynes. Other well-known proponents of Bayesian probability have included L. J. Savage, Frank P. Ramsey, John Maynard Keynes, and B.O. Koopman.

The frequentist interpretation of probability was preferred by some of the most influential figures in statistics during the first half of the twentieth century, including R.A. Fisher, Egon Pearson, and Jerzy Neyman. Thus for some decades the Bayesian interpretation fell out of favor. Beginning about 1950 and continuing into the present day, the work of Savage, Koopman, Abraham Wald, and others has led to broader acceptance.

Varieties of Bayesian probability

The terms *subjective probability*, *personal probability*, *epistemic probability* and *logical probability* describe some of the schools of thought which are customarily called "Bayesian". These overlap but there are differences of emphasis.

Subjective probability is supposed to measure the degree of belief an individual has in an uncertain proposition.

Some Bayesians do not accept the subjectivity. The chief exponents of this objectivist school were Edwin Thompson Jaynes and Harold Jeffreys. Perhaps the main objectivist Bayesian now living is James Berger of Duke University. Jose Bernardo and others accept some degree of subjectivity but believe a need exists for "reference priors" in many practical situations.

Advocates of **logical probability**, (such as Harold Jeffreys, Richard Threlkeld Cox, and Edwin Jaynes), hope to codify techniques that would enable any two persons having the same information relevant to the truth of an uncertain proposition to independently calculate the same probability. Except for simple cases the methods proposed are controversial. Critics challenge the suggestion that it is possible or necessary in the absence of information to start with an objective prior belief which would be acceptable to any two persons who have identical information.

Bayesian and frequentist probability

The Bayesian approach is in contrast to the concept of *frequency probability* where probability is held to be derived from observed or imagined frequency distributions or proportions of populations. The difference has many implications for the methods by which statistics is practiced when following one model or the other, and also for the way in which conclusions are expressed. When comparing two hypotheses and using some information, frequency methods would typically result in the rejection or non-rejection of the original hypothesis with a particular degree of confidence, while Bayesian methods would suggest that one hypothesis was more probable than the other or that the expected loss associated with one was less than the expected loss of the other.

Bayes' theorem is often used to update the plausibility of a given statement in light of new evidence. For example, Laplace estimated the mass of Saturn (described above) in this way. According to the frequency probability definition, however, the laws of probability are not applicable to this problem. This is because the mass of Saturn is a constant and not a random variable, therefore, it has no frequency distribution and so the laws of probability cannot be used.

Applications of Bayesian probability

Today, there are a variety of applications of personal probability that have gained wide acceptance. Some schools of thought emphasise Cox's theorem and Jaynes' principle of maximum entropy as cornerstones of the theory, while others may claim that Bayesian methods are more general and give better results in practice than frequency probability. See Bayesian inference for applications and Bayes' Theorem for the mathematics.

Bayesian inference is proposed as a model of the scientific method in that updating probabilities via Bayes' theorem is similar to the scientific method, in which one starts with an initial set of beliefs about the relative plausiblity of various hypotheses, collects new information (for example by conducting an experiment), and adjusts the original set of beliefs in the light of the new information to produce a more refined set of beliefs of the plausibility of the different hypotheses. Similarly the use of Bayes factors has been put forward as justifications for Occam's Razor.

Bayesian techniques have recently been applied to filter out email spam with good success. After submitting a selection of known spam to the filter, it then uses their word occurrences to help it discriminate between spam and legitimate email.

See Bayesian inference and Bayesian filtering for more information in this regard.

See also

- uncertainty
- inference
- Doomsday argument for a controversial use of Bayesian inference

External links and references

- On-line textbook: Information Theory, Inference, and Learning Algorithms (*http://www.inference.phy.cam.ac.uk/mackay/itila/book.html*), by David MacKay, has many chapters on Bayesian methods, including introductory examples; compelling arguments in favour of Bayesian methods (in the style of Edwin Jaynes); state-of-the-art Monte Carlo methods, message-passing methods, and variational methods; and examples illustrating the intimate connections between Bayesian inference and data compression.
- http://www-groups.dcs.st-andrews.ac.uk/history/Mathematicians/Ramsey.html
- David Howie: *Interpreting Probability, Controversies and Developments in the Early Twentieth Century*, Cambridge University Press, 2002, ISBN 0521812518
- Colin Howson and Peter Urbach: *Scientific Reasoning: The Bayesian Approach*, Open Court Publishing, 2nd edition, 1993, ISBN 0812692357, focusses on the philosophical underpinnings of Bayesian and frequentist statistics. Argues for the subjective interpretation of probability.
- Jeff Miller "Earliest Known Uses of Some of the Words of Mathematics (B)" (*http://members.aol.com/jeff570/b.html*)
- Paul Graham "Bayesian spam filtering" (*http://www.paulgraham.com/better.html*)

Categories: Probability and statistics